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ENGLISH TRANSLATIONS TO ANNEXES OF PRELIMINARY EXAMINATION REPORT PCT/EP/2004/004703 DATED MARCH 15, 2005.

Claims

1. A method for the selective oxidation of at least one carbohydrate, a carbohydrate mixture or a composition having a content thereof, where an aqueous solution of the carbohydrate, of the mixture or of the composition is reacted in the presence of a gold catalyst comprising nanodispersed gold particles on a metal oxide support, and of oxygen, where an aldehyde group on the C1 carbon atom of the carbohydrate(s) is selectively oxidized to a carboxyl group, or an aldehyde group is introduced on the C1 carbon atom and selectively oxidized to a carboxyl group.

2. The method as claimed in claim 1, where the metal oxide support of the gold catalyst is a TiO_2 support.

3. The method as claimed in claim 2, where the TiO_2-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

4. The method as claimed in claim 1, where the metal oxide support of the gold catalyst is an Al_2O_3 support.

5. The method as claimed in claim 4, where the Al_2O_3-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

6. The method as claimed in any of claims 1 to 5, where the oxidation is carried out at a pH of from 7 to 11.

7. The method as claimed in any of claims 1 to 6, where the oxidation is carried out at a temperature of from 20°C to

140°C, preferably 40°C to 90°C.

8. The method as claimed in any of claims 1 to 7, where the oxidation is carried out under a pressure of from 1 bar to 25 bar.

9. The method as claimed in any of claims 1 to 8, where oxygen and/or air is bubbled through the aqueous solution of the carbohydrate, of the mixture or of the composition during the oxidation.

10. The method as claimed in any of claims 1 to 9, where the ratio between the amount of the carbohydrate(s) to be oxidized or of the mixture and the amount of the gold present on the metal oxide support is greater than 1000.

11. The method as claimed in any of claims 1 to 10, wherein the carbohydrate to be oxidized is an aldose having an aldehyde group on the C1 carbon atom.

12. The method as claimed in any of claims 1 to 10, wherein the carbohydrate to be oxidized is in the 2-ketose form which is initially converted into the oxidizable tautomeric aldose form.

13. The method as claimed in claim 11 or 12, where the carbohydrate to be oxidized is a monosaccharide, an oligosaccharide, a mixture thereof or a composition having a content thereof.

14. The method as claimed in any of claims 11 to 13, where the monosaccharide to be oxidized is glucose,

galactose, mannose, xylose or ribose.

15. The method as claimed in claim 14, where gluconic acid is obtained as oxidation product in the oxidation of glucose.

16. The method as claimed in claim 13, where the oligosaccharide to be oxidized is a disaccharide.

17. The method as claimed in claim 16, where the disaccharide is a disaccharide aldose such as maltose, lactose, cellobiose or isomaltose.

18. The method as claimed in claim 17, where maltobionic acid is obtained as oxidation product in the oxidation of maltose.

19. The method as claimed in claim 17, where lactobionic acid is obtained as oxidation product in the oxidation of lactose.

20. The method as claimed in claim 16, where the disaccharide is a disaccharide 2-ketose such as palatinose.

21. The method as claimed in claim 13, where the carbohydrate to be oxidized is maltodextrin.

22. The method as claimed in claim 13, where the carbohydrate to be oxidized is a starch syrup.

23. A method for the selective oxidation of at least one oligosaccharide, a mixture thereof or a composition having a content thereof, where an aqueous solution of the oligosaccharide, of the mixture or of the composition is

reacted in the presence of a gold catalyst comprising nanodispersed gold particles on a support, and of oxygen, where an aldehyde group on the C1 carbon atom of the carbohydrate(s) is selectively oxidized to a carboxyl group, or an aldehyde group is introduced on the C1 carbon atom and selectively oxidized to a carboxyl group.

24. The method as claimed in claim 23, where the support of the gold catalyst employed is a TiO_2 support.

25. The method as claimed in claim 24, where the TiO_2-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

26. The method as claimed in claim 23, where the support of the gold catalyst employed is an Al_2O_3 support.

27. The method as claimed in claim 26, where the Al_2O_3-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

28. The method as claimed in claim 23, where the support of the gold catalyst employed is a carbon support.

29. The method as claimed in claim 28, where the carbon-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

30. The method as claimed in any of claims 23 to 29, where the oxidation is carried out at a pH of from 7 to 11.

31. The method as claimed in any of claims 23 to 30, where the oxidation is carried out at a temperature of from

20°C to 140°C, preferably 40°C to 90°C.

32. The method as claimed in any of claims 23 to 31, where the oxidation is carried out under a pressure of from 1 bar to 25 bar.

33. The method as claimed in any of claims 23 to 32, where oxygen and/or air is bubbled through the aqueous solution of the oligosaccharide, of the mixture or of the composition during the oxidation.

34. The method as claimed in any of claims 23 to 33, where the ratio between the amount of the oligosaccharide(s) to be oxidized or of the mixture and the amount of the gold present on the support is greater than 1000.

35. The method as claimed in any of claims 23 to 34, where the oligosaccharide to be oxidized is an aldose having an aldehyde group on the C1 carbon atom.

36. The method as claimed in claim 35, where the oligosaccharide to be oxidized is a disaccharide aldose.

37. The method as claimed in claim 36, where the disaccharide aldose is maltose, lactose, cellobiose or isomaltose.

38. The method as claimed in claim 37, where maltobionic acid is obtained as oxidation product in the oxidation of maltose.

39. The method as claimed in claim 37, where lactobionic acid is obtained as oxidation product in the oxidation of

lactose.

40. The method as claimed in any of claims 23 to 34, where the oligosaccharide to be oxidized is in the 2-ketose form which is converted into the oxidizable tautomeric aldose form before the oxidation.

41. The method as claimed in claim 40, where the oligosaccharide to be oxidized is a disaccharide 2-ketose.

42. The method as claimed in claim 41, where the disaccharide ketose is palatinose.

43. The method as claimed in any of claims 23 to 34, where the oligosaccharide mixture to be oxidized is maltodextrin.

44. The method as claimed in any of claims 23 to 34, where the composition to be oxidized is a starch syrup.

45. An oxidation product obtainable by selective oxidation of maltose by use of a gold catalyst comprising nanodispersed gold particles on a metal oxide support by a method as claimed in any of claims 1 to 22 or by use of a gold catalyst comprising nanodispersed gold particles on a support by a method as claimed in any of claims 23 to 44, where the oxidation product comprises more than 95% maltobionic acid.

46. An oxidation product obtainable by selective oxidation of lactose by use of a gold catalyst comprising nanodispersed gold particles on a metal oxide support by a

method as claimed in any of claims 1 to 22 or by use of a gold catalyst comprising nanodispersed gold particles on a support by a method as claimed in any of claims 23 to 44, where the oxidation product comprises more than 95% lactobionic acid.

47. The use of a gold catalyst comprising nanodispersed gold particles on a metal oxide support for the selective oxidation of at least one carbohydrate, a carbohydrate mixture or a composition having a content thereof.

48. The use as claimed in claim 47, where the metal oxide support of the gold catalyst is a TiO_2 support.

49. The use as claimed in claim 48, where the TiO_2-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

50. The use as claimed in claim 47, where the metal oxide support of the gold catalyst is an Al_2O_3 support.

51. The use as claimed in claim 50, where the Al_2O_3-supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

52. The use as claimed in any of claims 47 to 51, where the carbohydrate to be oxidized is a monosaccharide, an oligosaccharide, a mixture thereof or a composition having a content thereof.

53. The use as claimed in claim 52, where the monosaccharide to be oxidized is glucose, galactose, mannose,

xylose or ribose.

54. The use as claimed in claim 53, where gluconic acid is obtained as product of the oxidation of glucose.

55. The use as claimed in claim 52, where the oligosaccharide to be oxidized is a disaccharide aldose.

56. The use as claimed in claim 55, where the disaccharide aldose to be oxidized is maltose, lactose, cellobiose or isomaltose.

57. The use as claimed in claim 56, where maltobionic acid is obtained as product of the oxidation of maltose.

58. The use as claimed in claim 56, where lactobionic acid is obtained as product of the oxidation of lactose.

59. The use as claimed in claim 52, where the oligosaccharide to be oxidized is a disaccharide ketose.

60. The use as claimed in claim 59, where the disaccharide ketose to be oxidized is palatinose.

61. The use as claimed in claim 52, where the carbohydrate to be oxidized is maltodextrin.

62. The use as claimed in claim 52, where the carbohydrate to be oxidized is a starch syrup.

63. The use of a gold catalyst comprising nanodispersed gold particles on a carbon support for the selective oxidation of at least one oligosaccharide, an oligosaccharide mixture or a composition having a content thereof.

64. The use as claimed in claim 63, where the carbon-

supported gold catalyst comprises about 0.1% to 5% gold, preferably about 0.5% to 1% gold.

65. The use as claimed in claim 63 or 64, where the oligosaccharide to be oxidized is an oligosaccharide aldose.

66. The use as claimed in claim 65, where the oligosaccharide aldose to be oxidized is maltose, lactose, cellobiose or isomaltose.

67. The use as claimed in claim 66, where maltobionic acid is obtained as product of the oxidation of maltose.

68. The use as claimed in claim 66, where lactobionic acid is obtained as product of the oxidation of lactose.

69. The use as claimed in claim 63 or 64, where the oligosaccharide to be oxidized is in the 2-ketose form which is initially converted into the tautomeric aldose form and then oxidized.

70. The use as claimed in claim 69, where the oligosaccharide 2-ketose to be oxidized is palatinose.

71. The use as claimed in claim 63 or 64, where maltodextrin is oxidized.

72. The use as claimed in claim 63 or 64, where a starch syrup is oxidized.